- magnetic resonance signals are acquired,
- the position of a measuring site is determined, and
- the magnetic resonance image is reconstructed from the magnetic resonance signals and on the basis of the position of the measuring site.

In accordance with the invention, the position of a measuring site is separately determined; for example, such a position can be separately measured. Furthermore, a predetermined geometrical relationship exists between the measuring site and the region reproduced in the magnetic resonance image. On the basis of the position determined for the measuring site, disturbances due to motion of the object to be examined can be avoided in the magnetic resonance image on the basis of the predetermined geometrical relationship between the measuring site and the region to be imaged. The object to be examined is, for example, a patient to be examined. During the acquisition of the magnetic resonance signals, the patient is liable to move and/or motions are liable to occur within the body of the patient, for example due to the respiration and/or the heartbeat. The magnetic resonance imaging method according to the invention notably ensures that hardly any disturbances which are due to such motions in and/or of the patient occur in the magnetic resonance image.

The invention is implemented, for example in such a manner that a selected slice of the object to be imaged contains the measuring site. Notably when images of the same slice are repeatedly formed it is achieved that the same slice is always accurately reproduced. It is then ensured that the selected slice always extends through the measuring site. The selection of such a slice is performed, for example on the basis of an RF excitation in combination with a selection gradient. Such a selection gradient is superposed on the steady magnetic field.

The magnetic resonance image can also be accurately corrected for motion in and/or of the object on the basis of the measured position of the measuring site and the predetermined geometrical relationship between the measuring site and the region to be imaged.

It has been found that the position of the measuring site can be readily determined. As a result, disturbances in the magnetic resonance image which are due to motion can be very simply counteracted.

These and other aspects of the invention will be elaborated on the basis of the following embodiments which are defined in the dependent Claims.

Preferably, a clearly recognizable detail of the object to be examined and an indication of the measuring site are reproduced in the magnetic resonance image. This is

realized, for example, by reproducing the relevant detail and the measuring site together in the magnetic resonance image. On the basis of the predetermined geometrical relationship between the measuring site and the relevant detail, the correct position of the reproduction of the detail relative to the indication of the measuring site in the magnetic resonance image can also be derived. On the basis of the derived correct position of the detail it can then be readily checked whether the position of the detail has shifted due to motion in and/or of the object and, if desired, the position of the detail in the magnetic resonance image can be corrected.

The magnetic resonance imaging method according to the invention is particularly suitable for accurately deriving the local temperature distribution in the object to be examined by means of the magnetic resonance imaging method. To this end, reference magnetic resonance signals are first acquired at a predetermined reference temperature, after which measuring magnetic resonance signals are acquired at a locally increased temperature in the object to be examined. A reference magnetic resonance image of the part of the object to be examined is reconstructed from the reference magnetic resonance signals. A measuring magnetic resonance image of the part of the object to be examined is reconstructed from the measuring magnetic resonance signals for which the temperature has locally been varied. The temperature variation causes a frequency shift of the measuring magnetic resonance signals relative to the reference magnetic resonance signals; this frequency shift will be referred to as "temperature dependent chemical shift". The measuring site is reproduced in the reference magnetic resonance image as well as in the measuring magnetic resonance image and the position of the measuring site is separately reproduced so as to be suitably recognizable in the reference magnetic resonance image and the measuring magnetic resonance image, or is separately measured. Furthermore, the predetermined geometrical relationship between the reproduction of the detail and the indication of the measuring site in the reference magnetic resonance image is also determined on the basis of the reference magnetic resonance image. As a result, the measuring magnetic resonance image and the reference magnetic resonance image can be made to register, the same details in both images then being situated in the same position in the images relative to the indication of the measuring site in both images. It is thus achieved that the local temperature variation can be accurately derived from the frequency shifts of the measuring magnetic resonance signals relative to the reference magnetic resonance signals while avoiding disturbances due to motion. The determination of the local variation of the temperature on the basis of the temperature dependent chemical shift per se is rather sensitive to motion, because the measuring magnetic resonance signals are spatially encoded on the basis of the frequencies of these signals. Because a separate

determination or measurement of the position of the measuring site is available according to the invention, the effect of the temperature dependent chemical shift can be separated from the frequency encoding of the position in space whereto the magnetic resonance signals relate.

The registration of the measuring magnetic resonance image with the reference magnetic resonance image, will be better as the positions of more different details in the measuring magnetic resonance image are corrected.

The measuring magnetic resonance image is preferably made to register with the reference magnetic resonance image by counteracting disturbances due to motions during the formation of the measuring magnetic resonance image. Disturbances due to motion can be counteracted according to the invention by ensuring, on the basis of the position determined for the measuring site, that the reference magnetic resonance signals and the measuring magnetic resonance signals relate to or originate from the same region of the object to be examined. This can be readily achieved by selecting, on the basis of the measuring site, the same slice of the object for the acquisition of the reference magnetic resonance signals as well as for the acquisition of the measuring magnetic resonance signals. Thus, prior to the reconstruction of the reference magnetic resonance image and the measuring magnetic resonance image it is already ensured that these two magnetic resonance images register.

It is also possible to make the reference magnetic resonance image and the measuring magnetic resonance image register after the reconstruction from the reference magnetic resonance signals and the measuring magnetic resonance signals. The measuring site is preferably chosen to be such that the indication of the measuring site is situated in substantially the same positions in the reference magnetic resonance image and the measuring magnetic resonance image. The shift of the reproduction of the detail in the measuring magnetic resonance image relative to the reproduction of the same detail in the reference magnetic resonance image then follows from the relative position of the reproduction of the same detail in the reference magnetic resonance image and the measuring magnetic resonance image relative to the indication of the measuring site.

It is a further object of the invention to provide a magnetic resonance imaging method enabling accurate measurement of the temperature distribution in the object to be examined.

This object is achieved by means of a method of forming a magnetic resonance image wherein: